REMARKS

Claims 1-35 are pending in this application. The original patent (US 5,867,214) issued with claims 1-18. Claims 19-34 were added with the preliminary amendment filed February 2, 2001. Claims 16, 19, and 24-28 are herein amended relative to that preliminary amendment. Claim 35 is new. No new matter has been introduced thereby. The Examiner objected to claim 18, and rejected claims 16, 17, 19, 24-27, and 31 over Parulski et al. (US 5,633,678), and claim 32 over Parulski combination with Aciu et al. (US 5,625,412). The Examiner allowed claims 1-15, 20-23, 28-30, 33, and 34.

Applicants traverse the Examiner's rejections with respect to the pending claims as amended.

Claim 19 was rejected under 35 U.S.C. 112, first paragraph. Examiner correctly points out that processed image data is not stored in the memory buffer, which is for storing raw image data generated by the image sensor. Accordingly, Claim 19 is herein amended to delete the limitation of "the memory buffer" with respect to where the central processing unit stores the processed imaged data. Support for this amendment can be found in Fig. 7.

Claim 26 was rejected under 35 U.S.C. 112, first paragraph as vague and indefinite as to how the compressed image data is stored in a first memory. Accordingly, independent Claim 24 has been amended to clarify the relationship between the first and second spooler routines and the first memory. Please see further discussion regarding Claim 24, below.

Claims 16, 17, 19, 24, 25, 27, and 31 were rejected under 35 U.S.C. 102(e) as being anticipated by Parulski et al. (US 5,633,678).

Claim 16 recites:

> 16. An apparatus for increasing image capture rate, comprising:
>
> an imaging device for generating raw image data responsive to an image capture request;
>
> a memory buffer for initially storing the raw image data;
>
> first routines for conveying the initially stored raw image data away from the memory buffer to a second memory location to provide space for

storing additional, subsequently captured images, wherein the raw image data is stored in uncompressed form in the second memory location;

second routines for processing said raw image data and for storing said processed image data; and

a central processing unit coupled to the imaging device and to the memory buffer, for executing according to a predetermined set of priorities the first and second routines;

wherein the first routines are assigned priority over the second routines to thereby facilitate the rapid conveyance of raw image data away from the memory buffer.

In digital cameras, two factors limit the rapid taking of multiple photos: storage space and processing time. When a picture is taken, raw image data is initially stored in the memory buffer (also known as the "frame buffer" or "image buffer"). The frame buffer has limited storage capacity. When it gets full, no more pictures can be taken. Photos can be compressed to take less space, but compression takes time. Compressing each photo as it is taken delays taking of the next photo. Waiting until the frame buffer is full and then compressing the photos causes even greater delay.

The claimed invention quickly empties the frame buffer by moving the raw image data to a second memory location prior to processing. This conveyance of data is designed to maintain the frame buffer in a condition to receive new image data from the imaging device. The time consuming process of compression is postponed in favor of a higher priority task—moving raw image data in uncompressed form out of the way in order to provide space for storing additional, subsequently captured images.

Parulski does not show conveying the initially stored raw image data away from the memory buffer to a second memory location in uncompressed form to provide space for storing subsequently captured images. Rather, in Parulski, "once a certain amount of digital image data has accumulated in the image buffer **18**, the stored data is applied to a programmed digital signal processor **22**, which...compresses each still image stored in the image buffer **18**." (Parulski col.

4 lines 22-30). Only after compression does Perulski "send[] the compressed data to a removable storage device." (Parulski col. 4, lines 36-37)

Thus, Claim 16 is patentable over Parulski.

Claim 19 as amended recites a CPU for:

> transferring the raw image data to a second memory, processing the raw image data and storing the processed image data according to a predetermined set of priorities, wherein transferring the raw image data has a higher priority than processing the raw image data.

Claim 19 has been amended to clarify that the transferring step of the claimed invention has a higher priority than the processing step. By transferring raw data from the image buffer to a second memory before processing, the image buffer is rapidly cleared so it can hold more photos.

In contrast, Parulski transfers data from the image buffer to a second memory only *after* processing. In Parulski, "a programmed digital signal processor **22**...compresses each still image stored in the image buffer **18**" and then "sends the compressed data to a removable storage device." (Parulski col. 4, lines 22-37)

Claim 24 as amended recites in part:

> a first spooler routine which moves raw image data out of a frame buffer and into a first memory, the first spooler routine having a highest priority;
>
> a processing/compression routine which compresses raw image data, the processing/compression routine having a middle priority;
>
> a second spooler routine which moves compressed image data out of a first memory and into flash memory, the second spooler routine having a lowest priority;

Claim 24 has been amended to clarify the relationship between the first and second spooler routines. In a preferred embodiment, by way of example, the first and second spooler routines can be seen as the Ram Spooler 1 **84** and the Flash Spooler 2 **92**, respectively, of Fig. 7. The first memory can likewise be seen as the Ram Disk **74**.

The claimed invention quickly empties the frame buffer by moving the raw image data out of the way to a first memory location prior to processing. This conveyance of data is designed to maintain the frame buffer in a condition to receive new image data from the imaging device. Only after this has been achieved does the claimed invention conduct the lower priority task of processing the image data.

In contrast, Parulski processes the image data first and then transfers it from the image buffer to another memory. "[A] programmed digital signal processor **22**...compresses each still image stored in the image buffer **18**" and then "sends the compressed data to a removable storage device." (Parulski col. 4, lines 22-37)

Claim 27 as amended recites:

27. A method for increasing a digital camera capture rate comprising the steps of:

transferring raw image data out of a frame buffer and into a second memory;

processing and compressing raw image data if either

the transferring raw image data step is complete or

processor time is available during the transferring raw image data step; and

transferring compressed image data from the second memory to flash memory if either

the processing and compressing step is complete or

processor time is available during the processing and compressing step.

Claim 27 has been amended to make explicit the second memory to which the raw image data, and from which the compressed image data, is transferred. Support for this can be found in Fig. 7.

Parulski does not disclose "processing and compressing raw image data if either the transferring raw image data step is complete or processor time is available during the transferring raw image data step." Parulski compresses first, and transfers later. (Parulski col. 4 lines 23-55) Parulski does not move the raw image data to a second memory to quickly free up space in the frame buffer before doing any processing. Claim 27 is patentable over Parulski.

Claims 17, 25, and 31 should be allowed by virtue of their dependence on allowable claims.

Claim 28 has been amended to fix four typographical errors: converting the uppercase "A"'s that introduced "A raw image input" and "A processor" to lowercase, and removing the two bullets.

Claim 32 was rejected under 35 U.S.C. 103(a) as being unpatentable in view of Parulski and Aciu, but should be allowed by virtue of its dependence on allowable Claim 16. Specifically, Claim 32 recites, in part:

> an imaging device for generating raw image data responsive to an image capture request;
>
> a memory buffer for initially storing the raw image data;
>
> first routines for conveying the initially stored raw image data away from the memory buffer to a second memory location to provide space for storing additional, subsequently captured images, wherein the raw image data is stored in uncompressed form in the second memory location;

second routines for processing said raw image data and for storing said processed image data; and

a central processing unit coupled to the imaging device and to the memory buffer, for executing according to a predetermined set of priorities the first and second routines;

wherein the first routines are assigned priority over the second routines to thereby facilitate the rapid conveyance of raw image data away from the memory buffer.

Parulski does not disclose or suggest conveying the initially stored raw image data to a second memory location to provide space for subsequently captured images. Rather Parulski "compresses each still image stored in the image buffer." (Parulski col. 4 lines 22-30) Only after compression does Perulski send the compressed data to a second memory location. (Parulski col. 4, lines 36-37) Aciu does not remedy this deficiency.

Thus, Claim 32 is patentable over Parulski as combined with Aciu.

Claim 18 was objected to as being dependent upon a rejected base claim, but should now be allowed by virtue of its dependence on allowable Claim 16.

If the Examiner believes that any issues remain outstanding prior to allowance of the remainder of the pending claims, she is respectfully invited to contact the undersigned attorney to resolve such issues in an expedient manner.

Favorable action is solicited.

Respectfully submitted,
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